The NEMES Gazette

Vol 3 No 26
June, 1998

The Newsletter of the New England Model Engineering Society,
Stephen C. Lovely, Editor, POBox 277 Milford, Ma 01757-0277, 508-473-8621
Ron Ginger, President, 17 Potter Road, Framingham, Ma 1701, ginger@ma.ultranet.com

Our Next Meeting is at 7:00 PM June 4, 1998 at the Museum, 154 Moody Street, Waltham Ma.

Annual dues is $20.00 - Please make checks payable to"NEMES" and send to the NEMES Treasurer: Kay R. Fisher 80 Fryeville Road Orange, MA 01364

This Months Contents

From the Editor's Desk:

Another months gone by already and it's time for another Gazette, this month we've got the conclusion of Steve Cushman's article on his LeBlonde lathe. How about writing up one of your projects for the Gazette?

I'd been looking forward to Paul Gauffin's swap meet, but Mike Boucher's new lathe needed to get out of the seller's basement and into Mike's that Saturday so I missed it.

See you next Thursday night, scl.

President's Corner
by Ron Ginger

June Meeting

This meeting we will devote to low cost Digital Read Outs. I have arranged for a demo unit to be shipped in from Shooting Star technology. We will examine the unit, and then have the guy that runs the company, Bill Chernoff, talk briefly, and answer questions, by telephone.

Bill is extending a discount to club members for the first two weeks of June. If 1 to 4 guys buy a unit, they will get them for $50 off (the same deal he had as a show special at NAMES). If 5-9 units are bought, they will be $75 off- or $525 each. If you want one of these, you order direct to Shooting Star, and indicate NEMES member.

I purchased a Mitutoyo Digimatic DRO last winter, and I'll bring in the Control unit and a partial slide and explain that unit.

At EASTEC I talked to the Sony folks, and learned a good deal about their low-end unit. They have promised to send me some brochures, and the Sony rep has offered to do a talk later- he couldn't make the arrangements on such short notice to do the June meeting.

Norm Jones bought a DRO from an English company, and Norm will describe his unit.

Museum Sale

At the time I'm writing this I have no further info on the Museums "Garage Sale" that Karen opened up last meeting. I assume we will know more by the June meeitng. For those that were not at the meeting, the museum is cleaning house to make way for an expansion, and we were allowed to tag items we were interested in buying, Karen promised the staff would evaluate the bids, and get back to those that were accepted. If you were not at the meeting, and might be interested in some of the museums junk (or treasure?) call Karen and make arrangements to visit and have a look.

Dues

To keep life simple for our treasurer, we have our dues period run from June to June for everyone, so, EVERYONE now owes dues for next year. It's still $20. Kay has asked for everyone to bring dues to the June meeting (a check is preferred) or mail them to him at:

Kay R. Fisher
80 Fryeville Rd
Orange MA 01364

Our dues go mostly to pay for the postage and prinitng of our newsletter, with a small amount to our guest speakers, just enouugh to buy them a nice dinner for taking the time to speak to us. We are a fairly low budget operation!

July Meeting

Our July meeting will be on Thursday, July 2. I know a lot of folks will have the Friday off, and some will likely take off Thursday night, so instead of a guest speaker we will do the 'poster session' again. Remember, this is when EVERYONE is asked to bring in something- parts, projects, plans, photos, whatever, to show something interesting they are working on.

Incorporation

As Mike Boucher reported at the last meting, we are moving along on our formal incorporation. Our by-laws say June is the election of officers, and we had a call for nominations at the May meeting.

That was about the longest period of silence we've had at a meeting, so our current slate of officers remains un-opposed for re-election. We will open nominations again at the June meeting, then have a vote.

--Ron

May-1998 Treasurers Report

Previous balance ---------- $1278.65

Interest ---------- .54

Service Charge ---------- -3.00

Service Charge ---------- -3.00

New balance ---------- $1273.19

The reason for two service charges is because the bank has been involved in a corporate merger and changed the billing period this month so I got a statement early.

IMPORTANT Village Press News

I just got a letter from Joe Rice and called him on the phone. They will not be giving any individual clubs (including us) discounts on subscriptions or books after June.

They will however allow you to extend your existing subscriptions for up to 3 years even if they are fresh.

For example - If you have just renewed your subscription to HSM you could now send a check for a 3 year extension to that subscription with the 25% discount. This would then give you a total subscription length of 4 years.

I have had to change the shipping charge on the Books so if you want to have a check made out in advance for a book at the June meeting just reduce the list price by 40 percent then round up then add $2.00 shipping

I expect to be really busy at the next meeting with dues. It could make it simpler if you bring checks. Then you don't need a receipt and if your name is on the check I don't need to mark you paid till I get home and go thru the checks. The same would be true for book orders. If you could have the check made out and the name of the book on the check you could save me a lot of time.

Dues is due.

Please bring checks for $20 made payable to NEMES for your dues.

==========

Respectfully,

Kay R. Fisher

Calendar of Events

Thursday June 4, 1998 -- 7 PM, NEMES MEETING at the Charles River Museum of Industry, 154 Moody Street, Waltham, Ma 02154, telephone 617-893-5410

Thursday July 2, 1998 -- 7 PM, NEMES MEETING at the Charles River Museum of Industry, 154 Moody Street, Waltham, Ma 02154, telephone 617-893-5410

Thursday August 6, 1998 -- 7 PM, NEMES MEETING at the Charles River Museum of Industry, 154 Moody Street, Waltham, Ma 02154, telephone 617-893-5410

Thursday September 3, 1998 -- 7 PM, NEMES MEETING at the Charles River Museum of Industry, 154 Moody Street, Waltham, Ma 02154, telephone 617-893-5410

Sunday September 13, 1998 -- NEMES Exhibit at the Northshore Old Car Club Show at Topsfield Fair Grounds.

The Meeting, 7 May, 1998

Ron got the meeting under way a little past 7 PM. There was some discussion of the things to come at the next couple of meetings, then we got to the nominations for officers. According to the Bylaws we adopted a while back the May meeting is when nominations for the next year are made, and then the June meeting is an official business meeting, including the election of officers for the following year. Current officers are Ron Ginger, President, Steven Cushman Vice President, Kay Fisher Treasurer, Stephen Lovely Secretary, and Mike Boucher Director at Large.

Since there were no nominations the current slate of officers is running unopposed so far. Be sure to bring your nominations for officers to the June meeting.

Mike Boucher had the paperwork fill out to make us the New England Model Engineering Society, Inc. All it needed was some signatures and a check for $35 or so. Maybe by the June meeting we'll be an Inc.

Richard Sabol not only brought Ledloy to sell in the parking lot before the May meeting, he had some 360 brass as well. He sold out before the people who were merely a little early for the meeting got there, and will have more before the June meeting.

Roland Gaucher reported that 400 Grove St in Worcester is going to become an MSC outlet. There's nothing there now but an order taker, but a store is hopefully going to be there in the future.

Bob Cummings of New England Brass would like to thank NEMES for it's support. He's looking to expand his line of products and would like to know what we'd like to be able to buy that he might add to his line.

Tim Harkness brought in some sheet aluminum that he had hydroformed. He used water at 200 PSI to form a 3 inch deep 15 inch diameter dish. He gripped the edge with two steel rings and started pumping. He had good results with the 15 inch version, but scaling it up to 4 foot diameter had caused him some troubles. He's starting with 5052 alloy about 1/2 hard and the goal is making solar concentrating mirrors. He seemed to be involved in a pretty good discussion with several interested folks at the break and after the meeting so hopefully he'll get some help with the problems he's having. If you have any info on the subject he'd like to hear from you.

The main speaker for the night was Fred Armbruster. Quite a few years ago Fred saw a rose engine in operation and decided he had to have one since they combined his interests in machinery, tools, and sculpture into a single neat package. The Holtzapfel Company in England is the best known of the builders of Ornamental Turning Lathes and Rose Engines. They built only 8 or 9 Rose Engines, but over 2000 Ornamental Turning Lathes. Since he figured that the chances of an ornamental turning lathe coming on the market that he could buy, let alone an even rarer rose engine, were almost nil he decided that he would have to make his own. He is now Seven Years into a project to build his own Rose Engine, which became two when he decided that building the second to sell would pay for the materials for both of them.

He started the drawings in 1989, and delivered the second engine in 1996 to a man in New Orleans who has already paid for it with the articles he has produced using it. It was delivered before all the accessories were completed, and there are still accessories to be made before it is truly complete.

Fred showed us a picture of a rose engine built in 1830 in England. His project was made possible by Warren Ogden of North Andover Ma who owned the Rose Engine that he most closely copied. Warren passed away 4 years ago and his Engine is no longer in the local area.

A Rose Engine is a variation on a metal lathe. The headstock is pivoted below the level of the lathe bed. For normal turning the headstock can be locked in place. When being used as a Rose Engine the headstock follows the surface of a rosette and moves the work towards and away from the cutting tool. While the headstock is following the radial pattern of the rosette, the mandrel slides in the headstock, moving into and away from the cutter as it follows the axial face of a rosette. So, the rosettes control both the radial and axial position of the work as it revolves in front of the cutter, producing the intricate and beautiful carvings that he passed around at the meeting. The "fixed" cutters that the work is moved past are are belt driven at up to 8000 RPM by an electric motor (the spindle is turned by foot power, allowing the operator better feel for the work than if the spindle were also powered by electricity.) Raising or lowering the cutter with respect to the centerline of the lathe varies the affect from the rosette.

The Headstock is made from an Iron casting done by the Henry Perkins Foundry in West Bridgewater Ma, who did all the iron castings in the two Rose Engines that Dr. Armbruster has built. (They also contain Bronze castings.) He showed us a series of slides on the construction of the headstocks. First were the beautiful split patterns, then the raw castings. To machine the headstock castings he made a steel plate with jack screws to level it and to hold it clamped and jacked for machining. He used a dial indicator to be sure that he hadn't warped anything in the clamping process. After the two headstocks were rough machined he sent them out to be stress releived. Then he set them up on the plate again and did the finish machining.

The original Holtzapfel lathe had casehardened and lapped mandrel and bushings for the spindle. He has one that was built in 1830, has seen pretty much continuous use since then, and is still okay, so he decided that the original bearing setup was plenty good for the Rose Engines he was building. His spindle bearings are 2 inches in diameter, hardened, ground, and lapped. The bushings are commercial drill bushings from a catalog.

After the slide of the headstock he showed us the procedure he followed to make a rather intricately shaped spring to keep the headstock following the rosette as it pivots. He was unable to determine exactly what the original material was, so he made them from O1 tool steel and they seem to be holding up well.

A conventional Ornamental Turning Lathe is used like you are making decorative gears. You need lots of formed cutters to make the different shapes of the "teeth". A rose engine on the other hand relies on its rosettes to produce the patterns on its work. The comparion is that while ornamental turning is like doing mosaic work in the bathroom, Rose Engine work is like wallpapering - it's faster and more fun. He said that the medallions he passed around would take only 15 or 20 minutes to generate on the Rose Engine.

Without rosettes you don't have a Rose Engine, so he had to make rosettes as part of the project. He had the good luck to find a rosette cutting machine in the Science Museum in England that he could study. The info he gained from studying the existing machine enabled him to build his own rosette cutting machine, based on a Deckel KF1 die sinking machine. The machine generates rosettes from

cams, with the cam turning from 2 to 144 times for each revolution of the rosette blank. By using two cams in the machine at one time he can cut a rosette with a wave on a wave. Since the ratio between the cam and the rosette it generates can be varied each cam can be used to produce an entire series of rosettes.

The Deckel Die Sinker Came from Brothers Machine, and he says that they made the entire project possible for him by providing him with the quality machinery he needed to begin the project before he was able to pay them in full for it.

The 7 inch diameter rosette has a long circumference. When the 7 inch rosette is used the generate a pattern on a 2 inch diameter object the effect is very different since the circumference is much less while the amplitude of the pattern from the rosette remains the same. Because of this effect he built an attachment to the rosette cutting machine that let's him use a pencil on paper to show what the pattern will be from the rosette that a particular cam setup would produce. This let's him produce rosettes that make patterns he likes without having to discard rosettes after they had been made because he doesn't like what they produce. The rosettes are shaped on both the edge (to control the pivoting of the headstock) and the edge (to control the in and out motion of the spindle.) After the rosettes are cut by the machine he smooths each one out by hand using a file.

An ornamental turning lathe was a big expense in Victorian England, costing about the same as a block of London Flats. A Rose Engine would be even more. Since the output was, as the name implies, ornamental, they were mostly bought by the rich. When Holtzapfel delivered a lathe they suggested that the first thing to do was to teach your wife or coachman to sharpen the tools.

In ornamental turning the finish on the product comes from the tool. In use a steel cutter might last only minutes or hours before it wears enough that the surface of the work begins to suffer. The English figured that carbide, because of its structure, wouldn't produce a good clean surface when used for ornamental turning (sanding after turning is generally not done, it blurs all the nice sharp edges you've worked so hard to produce.) But they didn't try it. It turns out that carbide works very well, and now with the advent of readily available tiny carbide inserts it is very practical for use in oranmental turning and with Rose Engines. Carbide tools stay sharp for weeks, not minutes or hours like steel.

In order to cut deeply in ornamental turning you need tools with small radii. You also need to be sure that if you sharpen the tool the radius is in the same place on the tool as it was before. Otherwise it won't cut quite the same pattern. To solve this problem he made a Lapping Machine that is capable of putting exactly the right radius in exactly the right place on the tool every time. It has a special ceramic wheel and uses diamond as the lapping media. Fred uses CPM 10V tool steel for the cutters he makes.

He spent lot's of time in the project making it look good. People in the Society of Ornamental Turners want him to make a Mark 2 version. If he does it'll be more middle of the road, more function, less flourishes. He made all of the parts himself except for the bed, which was too big for his machines and was planed then ground by a firm in Brockton. He has invested $30,000 in materials for the two lathes and their benches.

In Victorian times fixed tools were used to work metals, they didn't use rotating cutters on wood. This points to one of the few practical uses of the entire technology of ornamental turning - making the background patterns for documents that need to be secure, such as stocks, bonds, and money. In general the Ornamental Turning lathe and the Rose Engine were merely toys for well to do Victorian Gentlemen.

One of the things that he makes on the Rose Engine is refrigerator magnets, which he says are a big hit with his wife and her friends. Most of the items he passed around at the meeting were made of African Blackwood. It's one failing is that it looks so much like plastic. 90% of it is rejected by the musical instrument industry and unfortunately most of the rest ends up as charcoal.

There are a number of additional machines that he would like to build, and he also wants to take the Rose Engine further.

At the end of his talk he got a well deserved round of applause for an excellent presentation of a rather remarkable project.

After the meeting most everyone headed down into the storage area to check out what was there that they might like to bid on.

TIPS AND TECHNIQUES

by Ed Kingsley

BECOMING ENGAGED

A few weeks ago, I finally broke down ('went' broke) and bought myself a set of Gage Blocks on sale at MSC. Being the prudent, careful craftsman (anal retentive) that I am, I got the Grade "3" set instead of the (lots) cheaper, Toolroom "B" Grade set, because the "B" Grade is only certified to be accurate to +/- 50 millionths of an inch while the "3" Grade is never off more by than + 8 / -4 millionths, and I, the P, C (AR) craftsman noted above, certainly require (deserve) that level of accuracy.

Actually, I got the “3” Grade because each block was advertised as being individually serial numbered and certified, while the “B” Grade was not. However, the set I received was NOT actually individually serial numbered. The box had a small plate attached, with a 5 digit number that matched the certificate of calibration. MSC was very good about exchanging it for a serialized set, however, and I have received a letter and 4 phone calls responding to my unhappiness. I have found, after easily resolving a few complaints over several years, that they are a good company to deal with.

JAWS

The first thing I did with my new Gage Block Set (after wringing two together to see how hard it was to pull them apart ... very!) was to measure a .500” block with all of my calipers, and the 0-1” micrometers, to check out their accuracy’s. All of the mikes were within a .0001th of an inch. The caliper readings varied some.

I own B & S, Starrett, Helios and a Mitutoyo, with dials; 2 Chinese with dials; a Mitutoyo Digimatic and a Starrett Vernier. In general, all were accurate to better than .001”. Specifically, however, that accuracy depended on exactly where along the jaws the measurement was taken. On some of the calipers, the most accurate reading was at the tip of the jaws, on a couple it was in the middle and on a few it was at the top, close to the beam. At worst, the location on the jaw giving the least accurate measurement was not off more than .002”. Only the two Starretts (a 6” dial and a 24” vernier) were accurate at all positions on the jaws.

I had noticed discrepancies, when using some of these tools before, that I didn’t understand, and it made me less trusting of calipers in general. I have made note of the “sweet spot” on each of my calipers, and I feel more confident using them now. Gage blocks are “calibrated” so you know which way to compensate. Knowing your caliper’s “sweet spot” and/or deviation makes it possible to obtain accurate measurement, even with an imperfect tool. From now on, l plan on using Gage Blocks to “pre-calibrate” my calipers for all critical measurements.

Perhaps NEMES could have a “caliper clinic” at one of the meetings, or at our next show, where those unfortunate enough not to have their own individually serialized, Grade “3”, Gage Blocks could bring along their trusty measuring irons and put them to the test.

Moral: If nobody’s perfect, then I must be somebody.

SPACING OUT

The next best thing to your own set of Gage Blocks might be a set of Space Blocks. These handy spacers come in sets of 36 pieces, from .050” to an inch. Unlike Gage Blocks, which are square or rectangular, Space Blocks are cylindrical sections with round contact faces. They have a threaded hole running through the center, which allows them to be connected together with short lengths of threaded rod or set screws. Their primary function seems to be for tooling setups rather than inspection, but they’re precise enough to use for a lot of measuring jobs, too.

Accuracy is advertised as either +/- .0001” or +/- .00005”, depending on the source, and sets can be purchased for as little as $39. That’s a whole lot of zeros for less than $40.

NOTE: If you’re looking to check the accuracy of your mic’s and/or calipers, many industrial supply companies (like MSC) will sell you single Gage or Space Blocks. The Calibration Rods I have, that came with my larger-than-1” micrometers, all appear to be within +/- .00005” and would be suitable also, but a Space or Gage Block would be easier to use with calipers, I think.

PLEXIBRASS

I picked up a 2” travel, Dial Indicator a couple of weeks ago for $10. It was noticeably “used”. I could tell that the stem still moved, more or less smoothly, over it’s travel, but I wasn’t sure the pointer worked. When I got it home, I tried cleaning what was left of the crystal to see if the dial still had numbers on it. It looked like it had been used in one of those cigarette filter testing, automatic smoking machines. Detergent only evened out the brown. Denatured alcohol took off enough of the goo to determine that it did, indeed, still have numbers, but I still couldn’t make out how many there were.

Then I remembered using “Brasso” (metal polish) for the final finish on some acrylic work, and went hunting for the can. About 10 minutes, and 3 shiny fingers later, the view had improved considerably. I could see that all of the numbers had survived, and could even make out the thou-tics in between. Inspired, I dug out a pair of old calipers with a well scratched dial and, while I didn’t have the stamina to actually bring it to complete transparency, it did look quite marvelous. Be sure to use a soft cloth and try not to get any stuff inside where the little gears are.

I GET MISTY

I bought 3, 16 oz spray bottles, on sale, and I must say they’ve come in quite handy. I have one filled with water, and use it to keep the Wet-n-Dry sandpaper “wet” when sanding plastics and aluminum. It’s also helpful when the temperature in the shop gets above 90.

The second one has Denatured Alcohol in it, and I’ve found dozens of uses for that, I think. I usually get so high when I’m using it that I can’t always

remember what I'm doing, but I fill it up a lot so it must be very useful. It's good for cleaning stuff, I'm pretty sure.

The third one is filled with Dykem Layout Remover. I always clean the piece-to-be-laid-out with this stuff, before applying the dye, which insures a good, even, consistent coverage, and I've discovered that it's also pretty good for taking the dye off, after you're finished machining the part, too.

If I'd had the brains to get more than 3, I'd have filled the 4th one with a good Degreaser and the 5th maybe with Scotch, or possibly Gin, depending on the season.

MEDICAL ALERT

Be careful if you're taking Iron Supplements along with Viagra. Doctors warn that, in rare cases, you may be overcome with an uncontrollable urge to point North for several hours.

--Ed

Letters

Hi Steve:

Grand news! After many months of phone tag I bumped into my friend who works at Boston Digital at Easttec today. He is quite willing to host a Sunday tour of the B.D. facility and we set the last Sunday in September for the event. You might want to announce it in the news letter. The time is not set yet but we can discuss it at the meeting.

Also for the newsletter, could you ask who ever has the extension cord that I left behind at the show in February to please bring it with him for the June meeting. At long last my Thursday night course is over and I will be reappearing for out monthly meeting. The course (Materials science) was very interesting but I had to pay attention (!) and could not afford to miss any class meetings.

Best regards and see you in June.

Errol Groff

The fellow at Tool Time in Norwood tells me he will be closing by July 1. He has a number of new (in factory box or case) Starrett and Brown & Sharpe height gauges and vernier calipers. They are priced at 35-50% of new catalog prices. Various sizes.

Steven S. Cushman

Classified Ads

QUICK CHANGE GEAR Box for 9" South Bend Lathe $200 contact James Chetwynd Sr 781 665 1978

Delta table saw for sale,professional model from the early fifties, cabinet model, all orginal accessories included, good working condition, $225 Leo Klos W 978.282.2628 H 978.465.1960

Brand New GE industrial grade motor. Model 5KC45TP568AY, Frame FR56, 5/8 Shaft with key, 3/4 HP, 1 Ph 230 V, 5.4A, 60 Hz, 1725 RPM, Thermally Protected, with Stearns Electric Brakes for "Instant" stopping. $75 Don Strang, 781-456-3611

Lathe Rebuilding (Part 2)
by Steven S. Cushman

(continued from last month)

For the smaller stack section, three sections of flat stock were welded between the three spider arms at the large diameter end (where it would mate with the larger stack section), and these were faced even with the outer face of the larger diameter. Once the location of these sections of flat stock were known, holes were bored in the mating disk of the large section at a diameter to line up with these sections.

Next, the fifth and smallest step (which had been fabricated from 4" tubing) was pressed onto the small end of the smaller stack section. Four holes were bored and reamed through the 4" tubing into the cast iron flange it had been pressed onto. Dowel pins were then pressed into these holes and recessed slightly below the surface of the 4" tubing. This was intended to insure the add-on would not rotate under load. As a double safeguard, four holes were bored through the disk (previously welded into the center of the 4"tubing) and into the end of the cast iron flange. The holes were tapped and Allen head cap screws inserted.

A second keyway was machined into the shaft and both sections of the stack mounted. This allowed coming in from the large end and using a transfer punch to mark hole locations on the flat stock in proper alignment with the holes previously bored in the disk at the small end of the large section. The small section could then be removed and the holes bored and tapped. Remounted on the shaft, the sections were then pulled tight together with Allen head cap screws.

I now had a shaft with a 5 step stack of about the correct diameters, sort of in line but not true and with none of the steps having a centered crown.

Back to my friends 15" lathe, the assembled shaft was again mounted between centers. The face of each step was turned true, at least for the center third of the width of each step. I then turned tapers of about 7 degrees on the outside edges of each step. When I was done, the center third of each step was flat and the third of each step on the outside edges had a 7 degree taper in the appropriate direction. The tapers were then eased into the flat section with a file. Turning the flat and tapers of the largest step required a less than solid setup with a bent boring bar because the saddle of the lathe would not pass under either the largest or next to largest step.

[The crown profile is similar to the profile I use when crowning vertical bandsaw tires and I have found it to work well. For bandsaw tires I leave only about 20% of the tire flat at the center. The technique I use to crown bandsaw tires involves making up a wooden block with the desired profile and cementing abrasive paper to the block. The tire is then spun against the block to create the profile. I make an appropriate arm and mount the block to the bandsaw table and use the table tip mechanism to advance the abrasive against the tire. This works as described for the powered wheel. For the unpowered wheel, I make up a spinner allowing turning the spokes with a hand held drill (be sure the spinner is securely attached).]

In any case, once the crowns were completed, the shaft ends were turned to the 1.875" finish diameter required for the pillow blocks which were to mount the shaft. The dog was removed and the shaft staticly balanced (more or less) while it was still mounted between centers.

The next challenge would be mounting the assembly to the lathe. As the lathe was previously driven from a line shaft, there were no mounting points available.

The structure of the lathe provided a reasonable flat about 8.75 inches wide along the back of the bed casting. A 14" length of 8" structural channel was found to tuck nicely in this flat. I welded a longer section (about 40") of 8" channel to this horizontal piece such that it leaned back about 13 degrees and came up behind the lathe. The 13 degree number was not a design value but was achieved by tucking the lower end inside the channel flange and the upper end outside of the flange. This resulted in an arm which came behind and above the back gears. Eight holes were drilled through the 14" mounting plate. These holes were transferred to the lathe bed and tapped (1/2-13) to mount the assembly to the lathe. Holes were drilled and tapped at the top of the vertical arm. A subassembly was made to attach to the top of the vertical arm which projected horizontal arms (made of 3" channel) forward and level to the approximate centerline of the lathe. Plates were devised to project upwards. The intent was to pivot the drive assembly on pins through these plates. To allow this, holes were carefully bored in line through the plates. Since the idea was to use .5" pins, the holes were bored 1/64" oversize for clearance.

A rectangular assembly was welded up of structural channel to sit in a roughly horizontal plane and hold both the cone assembly and the motor. Holes were bored in the top of the frame to mount the pillow blocks and the motor. Plates were welded over the open side of the channel where the pivot pins would be located, and the assembly was mounted.

The shaft and stack were mounted in the pillow blocks. This unit was adjusted and shimmed carefully to be in line with and parallel to the headstock. A 12" diameter twin groove cast iron sheave was mounted to the drive end of the shaft and the assembly was then finish balanced in place. A monstrous 3 hp Baldor motor that I got from a rebuilder was mounted on the back end of the frame. This motor happens to have a large diameter shaft and as a result I was not able to use quite as small a sheave as I desired on the motor end. Consequently, I wound up with a speed range from 13 rpm to 680 rpm although I had a design goal low speed of 10 rpm.

To tension the belt, I copied the over center lever with adjusting screw design used on my Sheldon lathe, scaling it up appropriately for the LeBlond. The lever end with it's various curves was laid out on a piece of 3/8" flatstock and marked with a punch and soapstone. In an example of anything but precision machining, I carved it out "close" with a torch and then ground it to the desired profile at the bench grinder.

When all this was done, I was most pleased to see the belt track true at all speeds.

Another problem was the feed rod. Somehow, the rod had been bent badly in several different directions towards the left end of the rod. Making a new rod was going to be a lot of work for two reasons. First, the diameter of the rod is a non-standard size just less than 5/8", and standard sizes will not work. Second, the length of the rod is well in excess of the single capacity setup of any machine at hand; this problem would effect both the proper diameter and machining the keyway most of the length of the rod. Eventually, I cut the rod off just to the left of the keyway, removing the worst of the bends. The remainder was straightened adequately. A replacement section was machined for the left end. The two sections were joined by a half-lap within a tight fitting sleeve and retained by pins. In the course of these repairs, I removed the drive key from the apron. This is a rectangular key (1/8" x 1/4") about four inches long. The old key had worn to the point where it resembled a "T" section with the joint of the "T" worn paper thin.

This lathe has a thread dial which is not similar to the swing-aside designs used by manufacturers such as South Bend, Sheldon, Logan and others. Rather, the dial is entirely housed within the apron and the drive gear is always in contact with the lead screw. This is not as big a wear issue as it might seem because of the separate feed rod. Unless one is threading, the lead screw is not turning and there is minimal wear.

Most of the assembly was missing. The gear and drive shaft for the thread dial were gone. The dial itself was frozen in it's recess in the apron to the point

where I had to thread it's center hole and exert considerable force with a breaker bar on a fabricated puller to remove it.

I redesigned the assembly by boring and bushing the guide holes with standard oilite bushings instead of the original design of the drive shaft running tight in a long (3") hole through cast iron. This left the shaft with about 1/2" bushing contact at the top and bottom of the hole, with no contact in the middle.

A new dial was made up and fitted to a new shaft by press fit with a key. The shaft was drilled for an oil hole which drips on both the bushings and the gear. A gear of the proper diameter and number of teeth was obtained from Union Gear (I find Union Gear in Quincy MA a nice place to deal with. They don't have the selection of Boston Gear, but are perfectly happy to sell anything they carry over the counter at the warehouse). This was a 1/4" face gear and I thinned the teeth to about 1/8" face before imparting something approximating a helix angle to them with a file. Somewhat crude, but it works. The gear was keyed to the shaft. At this point, the dial was not calibrated. A reference point for calibration was obtained by setting up the gear train for an even number of threads and finding a point where the half-nut would engage. This became the zero line and the other lines were located by geometry from this line. The last task for the dial was to make a clear plexiglass cover for the dial to prevent chips from invading the recess in the apron. A ring made from a couple of flexible magnetic advertisement cards is cemented to the plexiglass cover. This holds the cover in place and makes it easy to remove.

One additional annoynace was the headstock and tailstock tapers. The factory tapers were Jarno. I am not prepared to debate the benefits of Jarno vs Morse vs B&S tapers, but Morse accessories are easy to come by and the others are not. I was thrilled to find a #4 Morse reamer during the first visit to Union Twist Drill. I quickly stuck the tailstock ram in a four jaw chuck, centered it and rough bored to #4 MT, finishing it with the reamer. This made it a little thin at the mouth end, so I made up a ring and pressed it on. The headstock taper does not bother me much because about all I use at this end is a center.

The NEMES Gazette

c/o Stephen C. Lovely

Post Office Box 277

Milford, Ma. 01757-0277

newsletter of The New England Model Engineering Society